

**NOAA  
FISHERIES**



# Fine-scale stock assignment with multiple markers: Leatherback turtles

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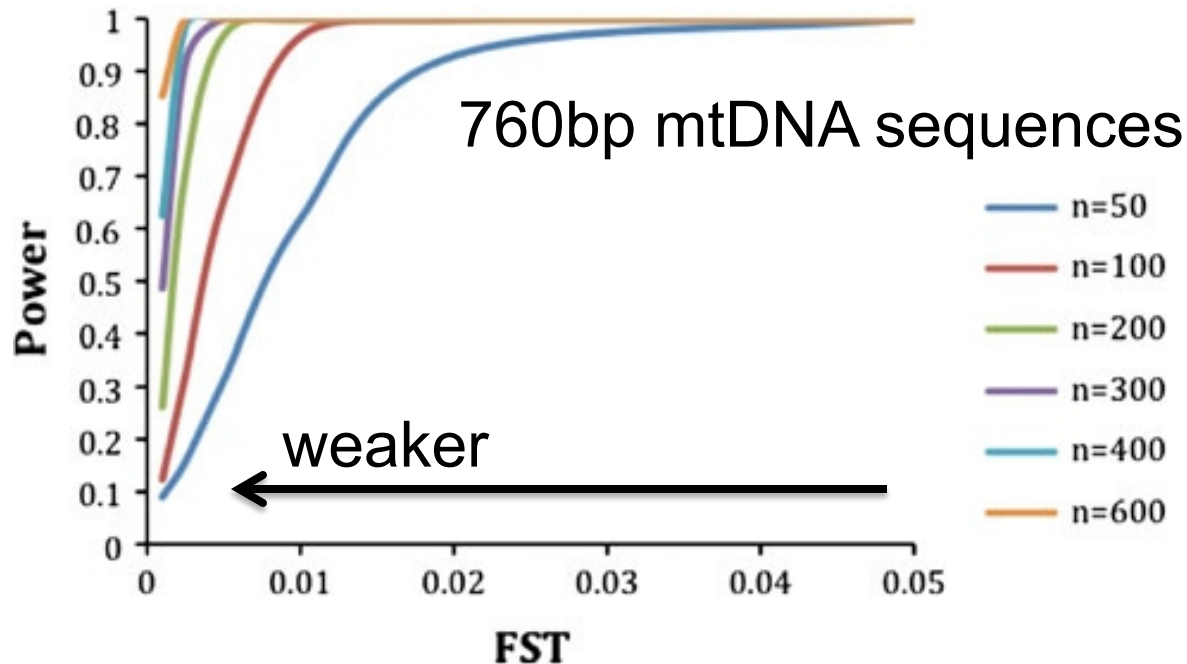
La Jolla, CA

# Towards DIPs for leatherbacks

- Develop suite of informative markers
  - 763 bp mtDNA sequences (+ mitogenomes)
  - 17 microsatellites (9 more optimized)
  - 42 SNPs discovered
- Obtain representative samples
  - 2,210 samples from 22 rookeries worldwide
  - Bycatch, strandings & in-water
    - 1,311 samples Atlantic
    - 221 samples Pacific



# Power to detect structure - leatherbacks

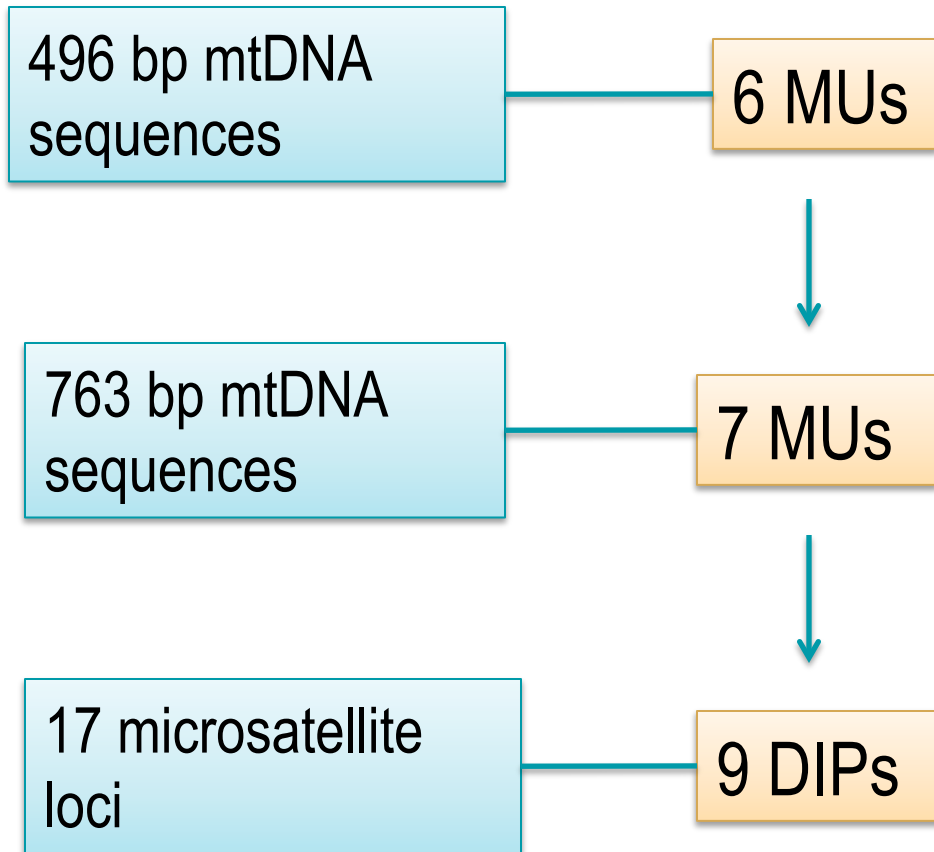


mtDNA has low power to detect weak ( $F_{ST} < 0.005$ ) structure

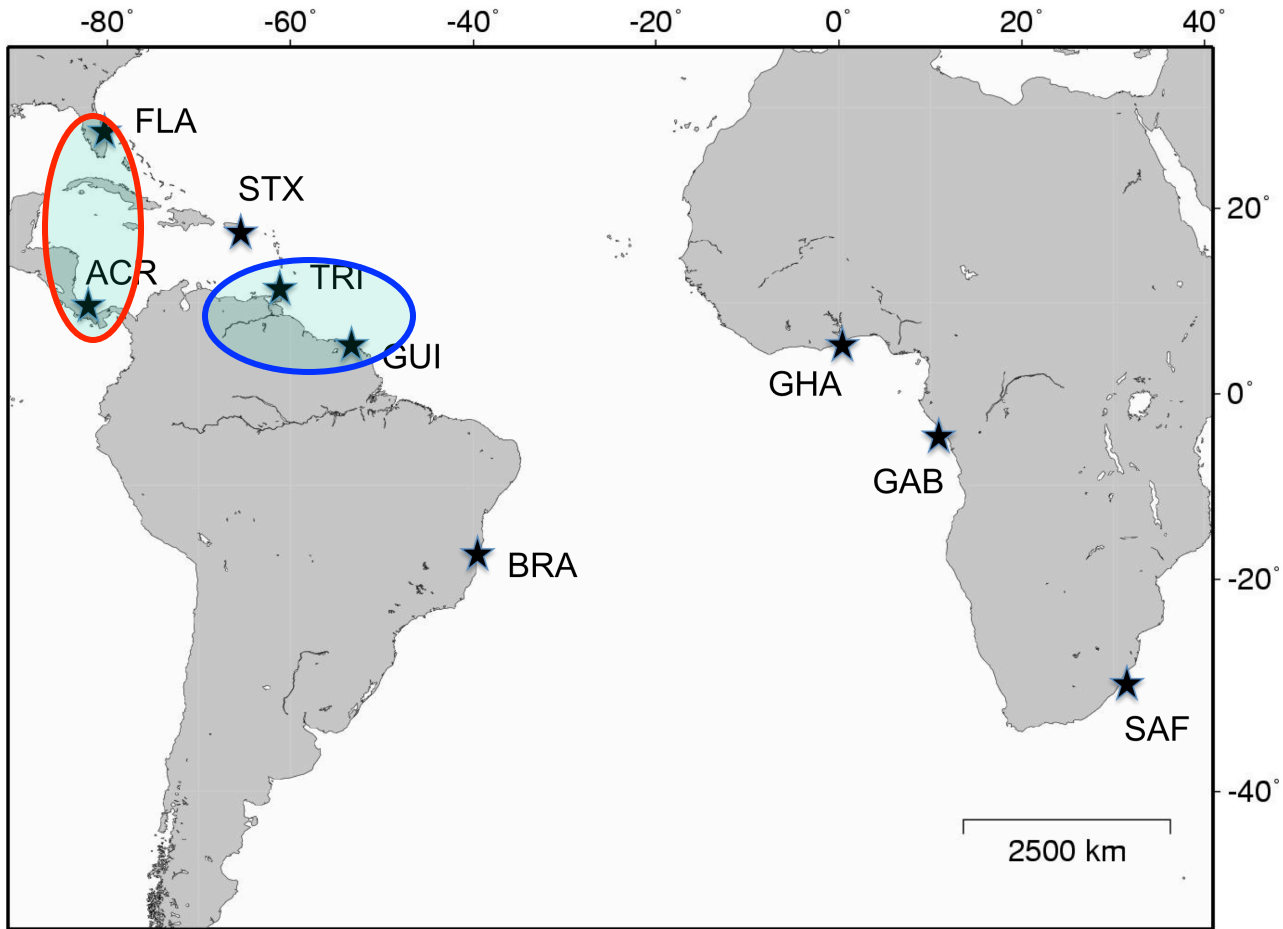
Microsatellites (17 loci) have high power (0.99 when  $F_{ST} = 0.001$ )

# Towards DIPs for leatherbacks

## 9 rookeries - (Atlantic-SW IO)



# 830 bp mtDNA sequences

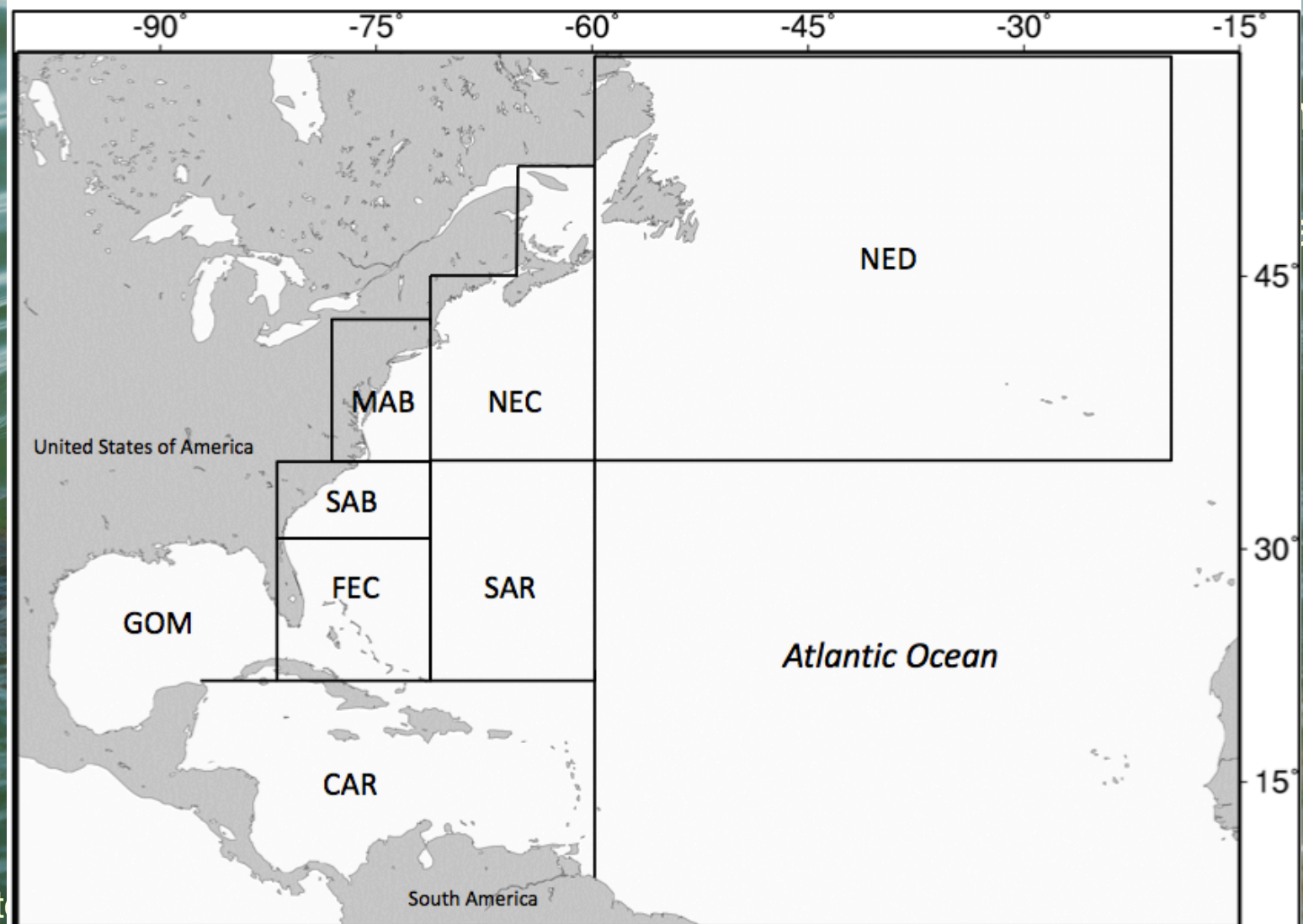


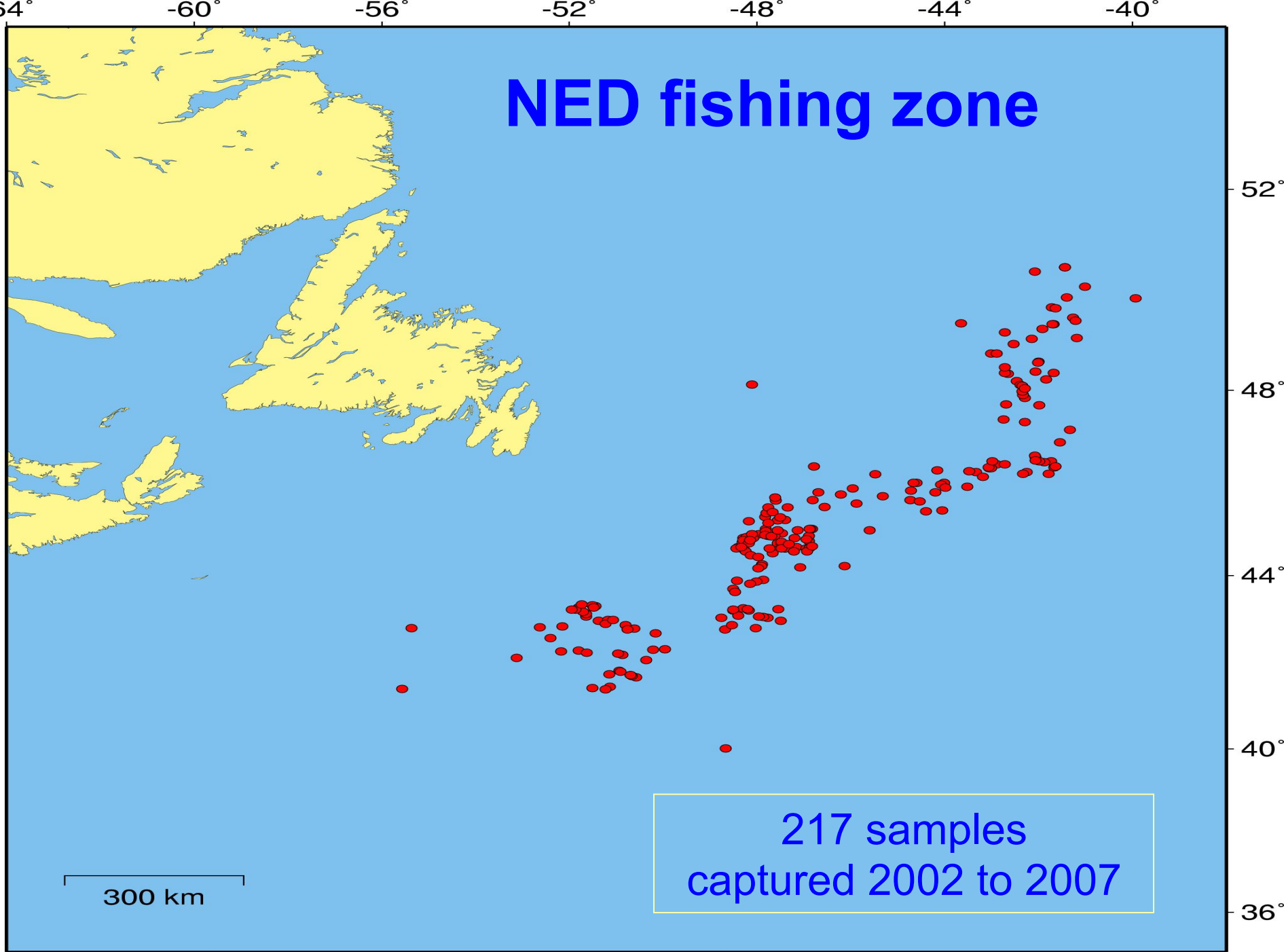
## Fisheries Bycatch

Microsatellite baseline dataset allows Stock Assignment of individual turtles



# Longline bycatch in the statistical zones of the Northwest Atlantic





# Gulf of Mexico fishing zone

100 samples  
captured 2004 to 2010

300 km

# Results

93% from Trinidad/ Fr. Guiana  
6% from Costa Rica

Florida

0

Costa Rica

13

St. Croix

3

Trinidad

134

Fr. Guiana

67

Brazil

0

Gabon & Ghana

0

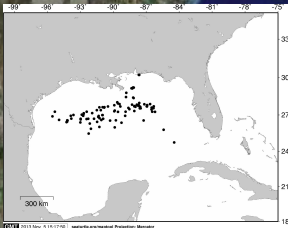
S. Africa

0

# Results

54% from Trinidad/ Fr. Guiana  
43% from Costa Rica

Significantly different distribution  
( $X^2 = 70.7$  df = 4,  $p < 0.001$ )  
NED 93% : 6%



Florida

0

Gabon &  
Ghana

0

0

S. Africa

Costa Rica

43

2

St. Croix

Trinidad

43

Fr. Guiana

11

Brazil

1

# Different distributions – NED vs. GOM



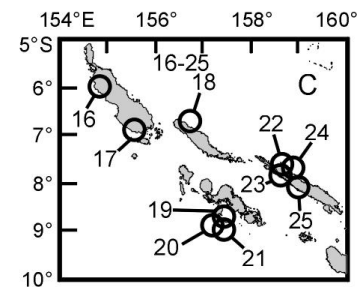
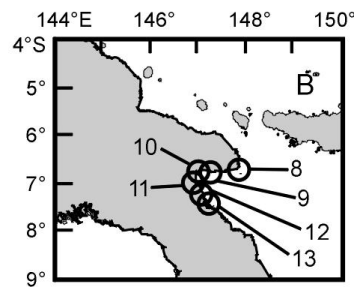
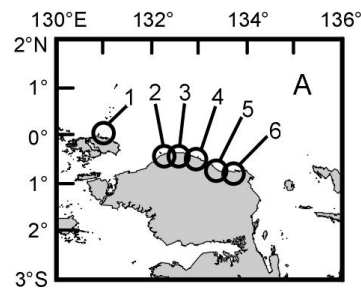
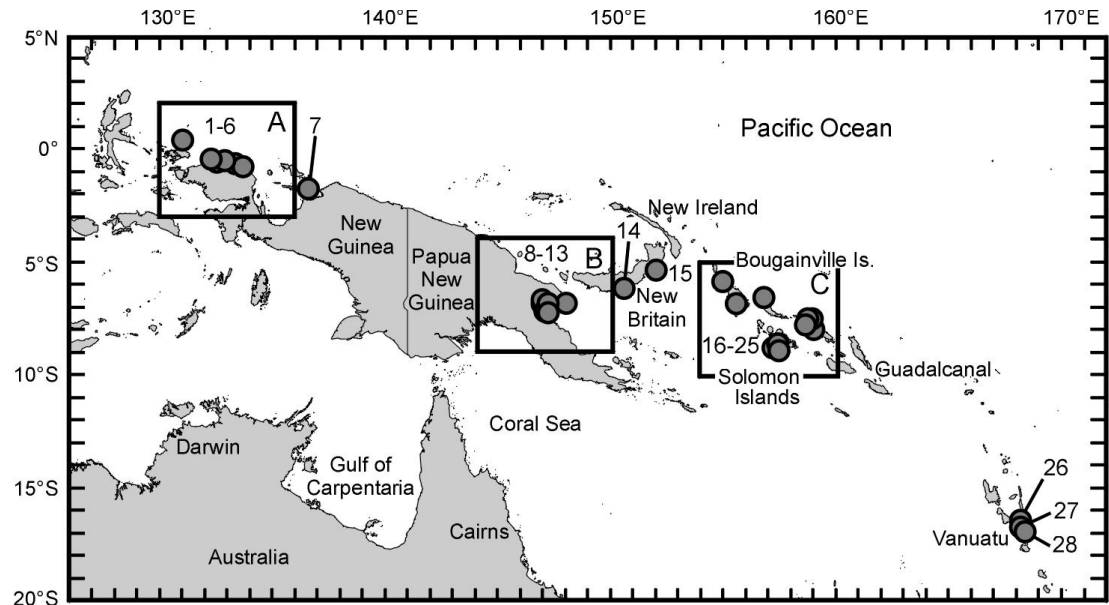
- Foraging populations are a composite of nesting populations
- Costa Rican turtles disproportionately caught in GOM
- Management and policy implications for various rookeries

# Risk Assessment

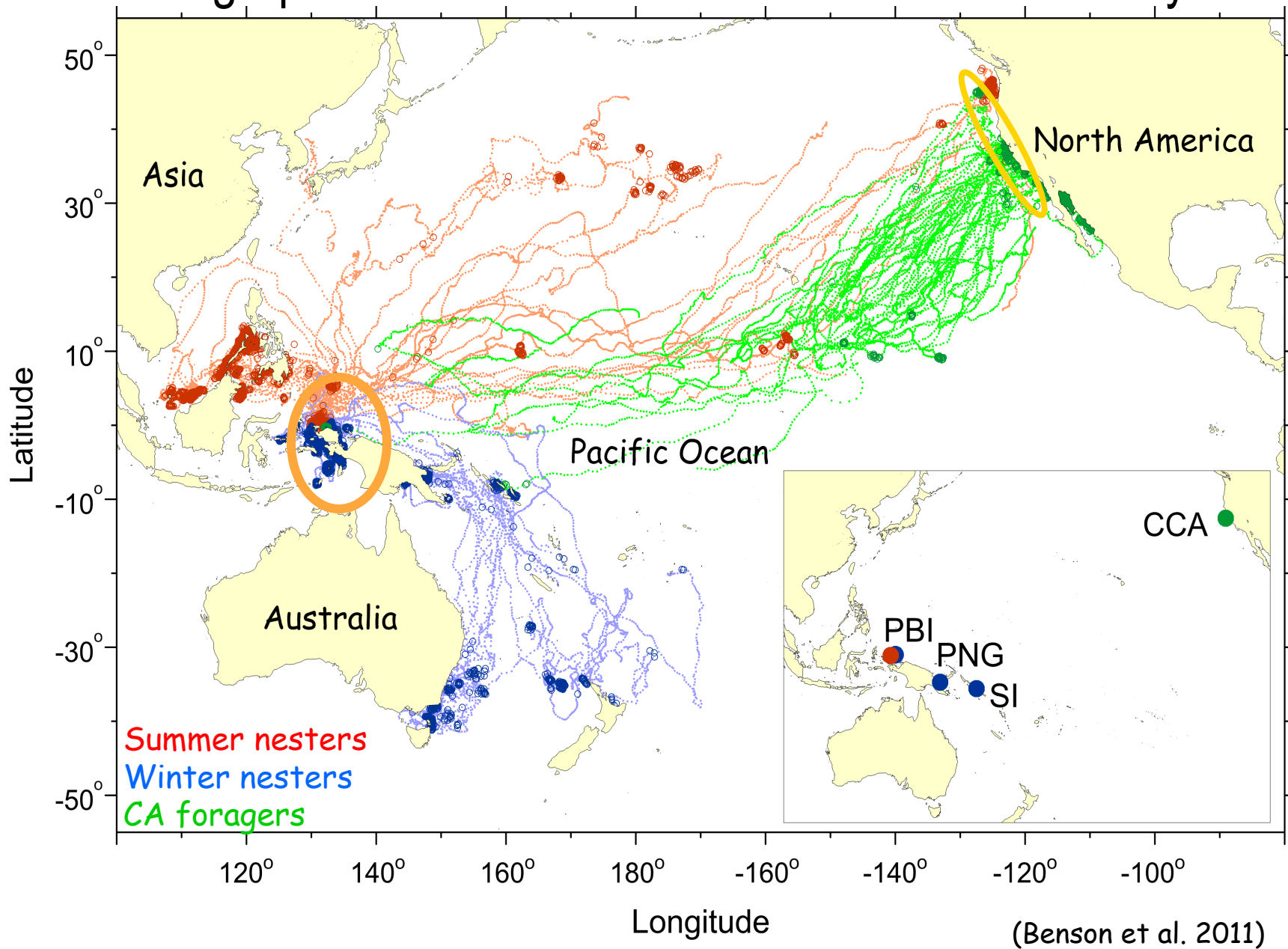
- Map UTC-specific distribution of juveniles, foraging
  - Delineate DIP, MU, DPS boundaries in ocean
- Integrate with fishing effort
- Move towards stock-specific (UTC) risk assessment

# Western Pacific leatherback Metapopulation

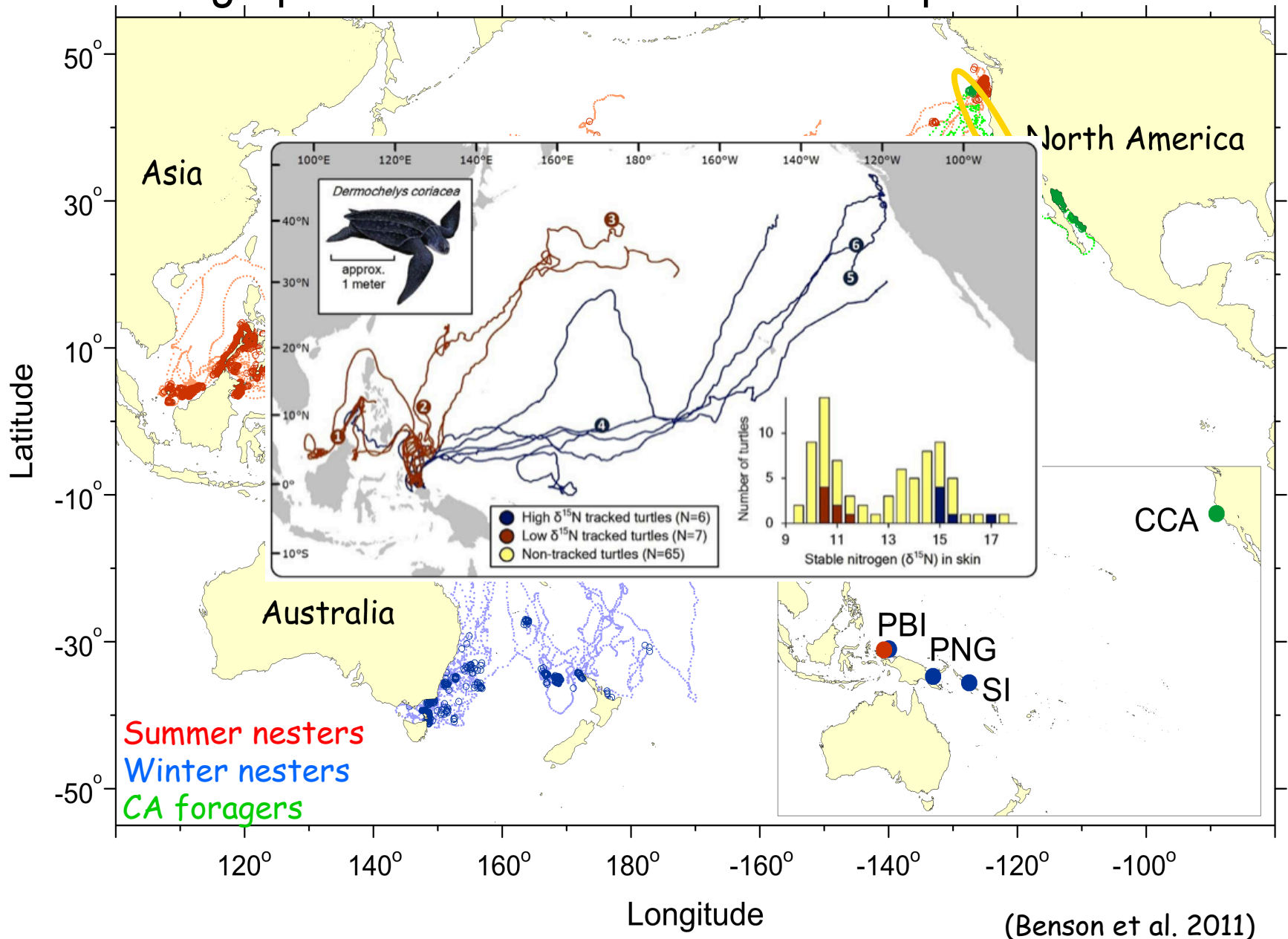
## Some DIPs not distinguishable with genetic markers



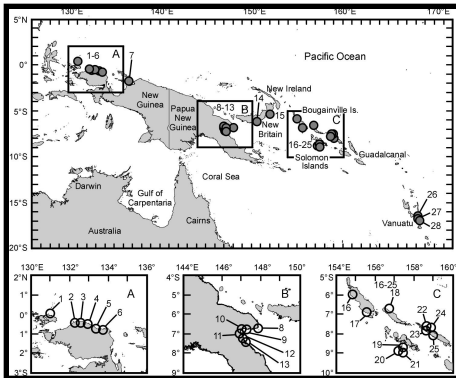
# Demographic structure evident from satellite telemetry



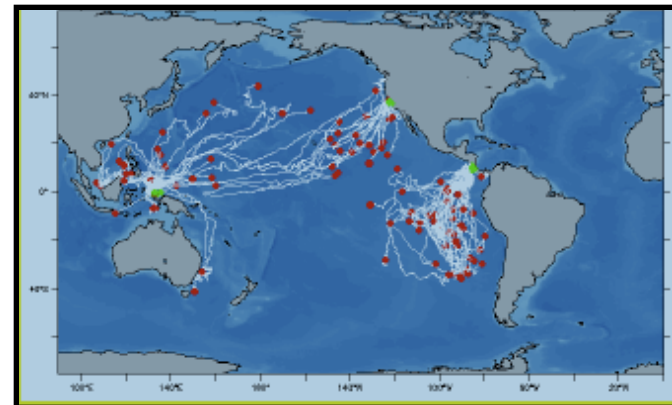
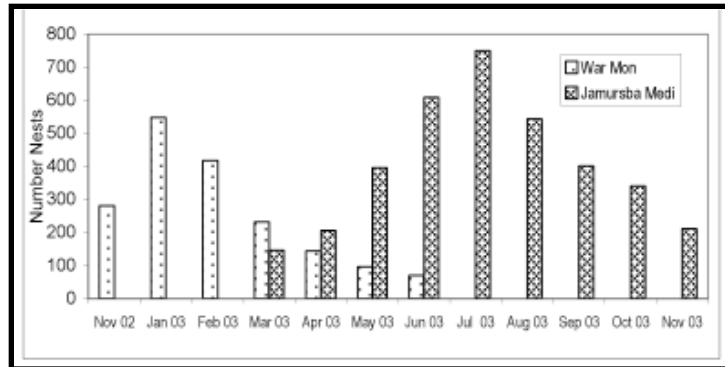
# Demographic structure evident from isotopes



# Climate change and UTCs



Maintaining integrity of metapopulation essential = species can adapt to environmental changes (local extinctions and recolonization)



# ***Questions?***

